5-5 Use Inequalities in a Triangle

Definition of Inequality-- a > b iff there is a positive number c, such that a = b + c

ex:

7 = 3 + 4

7 > 3 def of inequ.

7 > 4

Properties

Transitive

Addition/Subtraction

Multiplication/Division

Subst

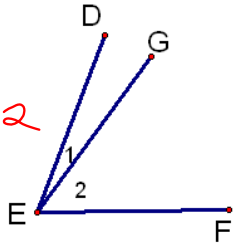
Ex:

LN = LM + MN SAP

LN > LM

LN > MN def of ineq.

Ex:



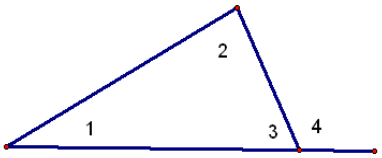
m∠DEF = m∠1 + m∠2

m∠DEF > m∠1

m∠DEF > m∠2

(def. of ineq)

Ex:



$m\angle 4 = m\angle 1 + m\angle 2$

$m\angle 4 > m\angle 1$

$m\angle 4 > m\angle 2$

Exterior Angle Inequality Theorem-The exterior angle of a triangle is greater than either of its corresponding remote interior angles

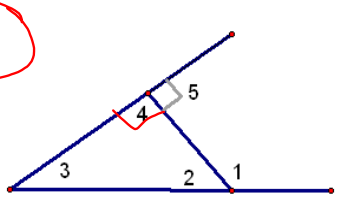
$m\angle 4 > m\angle 1$

$m\angle 4 > m\angle 2$

Which angle is the largest?

(Figure is not drawn to scale.)

$\angle 1$



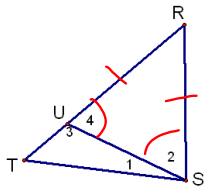
$m\angle 1 > m\angle 3$ $m\angle 5 > m\angle 3$

$m\angle 1 > m\angle 4$ $m\angle 5 > m\angle 2$

$m\angle 1 > m\angle 5$

Given: $\triangle RST$
$RU = RS$
$RT > RS$

Prove: $m\angle RST > m\angle T$

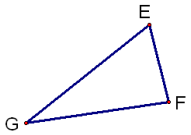


①	① Given
② $\angle 4 \cong \angle 2$	② BAT
③ $m\angle 4 = m\angle 2$	③ def of $\cong$
④ $m\angle RST = m\angle 1 + m\angle 2$	④ AAP
⑤ $m\angle RST > m\angle 2$	⑤ def of ineq
⑥ $m\angle RST > m\angle 4$	⑥ Subst
⑦ $m\angle 4 > m\angle T$	⑦ Ext $\angle$ ineq thm
⑧ $m\angle RST > m\angle T$	⑧ Transitive

Theorem 5.10--If one side of a triangle is longer than another side, then the angle opposite the longer side is larger than the angle opposite the shorter side.

G: GE > EF

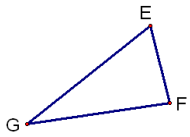
Concl: m∠F > m∠G



Theorem 5.11--If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than theside opposite the smaller angle.

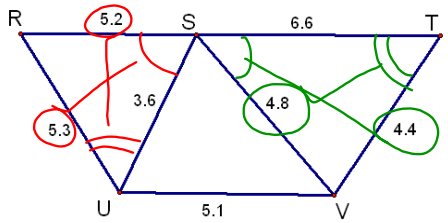
Given: m∠F > m∠G

Concl: GE > EF



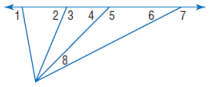
1. Which is greater, m∠RSU or m∠SUR?

2. Which is greater, m∠TSV or m∠STV?



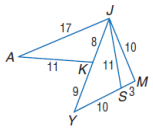
Determine which angle has the greatest measure.

17. ∠1, ∠2, ∠4
18. ∠2, ∠4, ∠6
19. ∠3, ∠5, ∠7
20. ∠1, ∠2, ∠6
21. ∠5, ∠7, ∠8
22. ∠2, ∠6, ∠8

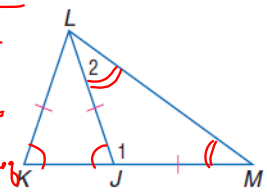


Determine the relationship between the measures of the given angles.

29. $\angle KAJ, \angle AJK$
30. $\angle MJY, \angle JYM$
31. $\angle SMJ, \angle MJS$
32. $\angle AKJ, \angle JAK$
33. $\angle MYJ, \angle JMY$
34. $\angle JSY, \angle JYS$



35. Given: $\overline{JM} \cong \overline{JL}$, $\overline{JL} \cong \overline{KL}$
Prove: $m\angle 1 > m\angle 2$

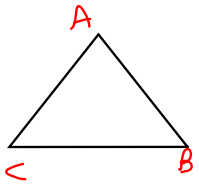


S.	R
① ~	① Given
② $\angle K \cong \angle LJK$	② BAT
③ $m\angle K = m\angle LJK$	③ def of $\cong$
④ $m\angle 1 > m\angle K$	④ Ext $\angle$ Ineq thm
⑤ $m\angle 1 > m\angle LJK$	⑤ Subst
⑥ $m\angle LJK > m\angle 2$	⑥ Ext $\angle$ Ineq thm
⑦ $m\angle 1 > m\angle 2$	⑦ Transitivity

Pasta Challenge

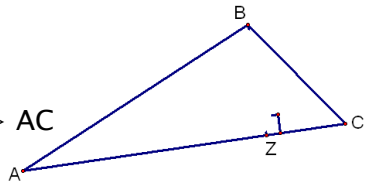
Thm. 5.12--<u>The triangle inequality theorem</u>--the sum of the lengths of any 2 sides of a triangle is greater than the length of the 3rd side.

$AB + BC > AC$
$AB + AC > BC$
$AC + BC > AB$



Let's Prove it.

Given: ΔABC
Prove: $AB + BC > AC$



Do the lengths represent a triangle?

4, 5, 7 yes $4+5>7$

13, 12, 20 yes
25

7, 14, 21 no
$21 = 21$

7, 7, 7 yes

8, 8, 19 no

Two sides of a triangle are 6 and 11.
What is the range of the 3rd side?

$5 < x < 17$

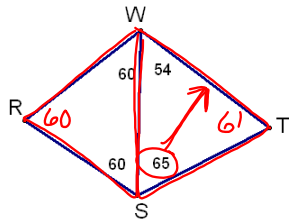
$11 - 6 = 5$ $\quad 6 + 11 = 17$

Two sides of a triangle are 12 and 18.
What is the range of the 3rd side?

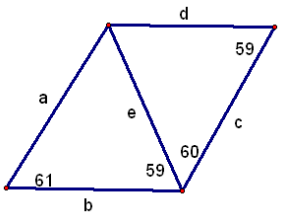
$6 < x < 30$

What is the longest segment?

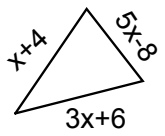
$\overline{WT}$



What is the longest segment?



Describe the possible values for x.



$x+4+3x+6 > 5x-8$

$18 > x$

$x+4+5x-8 > 3x+6$

$x > \frac{10}{3}$

$3x+6+5x-8 > x+4$

$x > \frac{6}{7}$

$\frac{10}{3} < x < 18$

$5x-8 > 0$

$x > \frac{8}{5}$

$3x+6 > 0$

$x > -2$

$x+4 > 0$

$x > -4$

HW p331-332
#s 6, 10-13, 16-19, 21-23, 30, 31, 33, 34